A STUDY TO ASSESS THE EFFECTIVENESS OF MUSCLE STRETCHING EXERCISES ON REDUCTION OF MUSCLE CRAMPS DURING HEMODIALYSIS AMONG PATIENTS UNDERGOING HEMODIALYSIS IN SELECTED HOSPITALS AT THIRUNELVELI

A DISSERTATION SUBMITTED TO THE TAMIL NADU DR. M.G.R.MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILLMENT FOR THE DEGREE OF MASTER OF SCIENCE IN NURSING

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

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BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled **"A Study to assess the effectiveness of muscle stretching exercises on reduction of muscle cramps during hemodialysis among patients undergoing hemodialysis at selected hospitals,Thirunelveli"** is a bonafide research work done by **Miss. A. Daphney Ethal,** M.Sc Nursing II year student from Nehru Nursing College, Vallioor, submitted in partial fulfillment for the Degree of Master of Science in Nursing under the Tamilnadu Dr. M.G.R Medical University, Chennai.

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CERTIFICATE BY THE GUIDE

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DECLARATION

I hereby declare that the present dissertation titled **"A Study to assess the effectiveness of muscle stretching exercises on reduction of muscle cramps during hemodialysis among patients undergoing hemodialysis at selected hospitals, Thirunelveli"** is the outcome of the original research work undertaken and carried out by me, under the guidance of **Dr.S.Chandrasekharan, M.Sc. N., PhD.,** Vice Principal, Medical Surgical Nursing, Nehru Nursing College, Vallioor.

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Date: **M.Sc. N, II year**

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Investigator

ABSTRACT

A Study to assess the effectiveness of muscle stretching exercises on reduction of muscle cramps during hemodialysis among patients undergoing hemodialysis at selected hospitals, Thirunelveli. The Objectives were;

1. To assess the pre- test level of muscle cramps among patients undergoing hemodialysis.
2. To find out the effectiveness of muscle stretching exercises on level of muscle cramps among patients by comparing pre and post intervention muscle cramps score.
3. To associate the pre test level of muscle cramps among patients with their selected clinical variables.

The Following Hypotheses were set for the Study:

H_1: There is significant reduction of muscle cramps experienced by the patients after practicing muscle stretching exercises during hemodialysis.

H_2 : There is significant association between muscle cramps and selected clinical variables.

Review was done on occurrence of muscle cramps associated with hemodialysis and effectiveness of physical exercises during and before hemodialysis sessions. The conceptual framework for this study was based on Modified Wiedenbach's Helping Art Clinical Nursing Theory. Research design for the study was quasi experimental one group pre-test post-test design and convenient sampling technique was used and the sample size was 30. Modified Muscle Cramp Assessment Scale was used to assess the muscle cramp before and after intervention.

The mean Post- test muscle cramp score level was 1.76 which was lower than the mean pre-test muscle cramp score level of 11.5. The obtained 't'value for the test was 15.70 at 0.05 level of significance. This data showed that there was significant reduction of muscle cramps with practice of muscle stretching exercises.

There was an association between the level of muscle cramps and the variables such as duration of hemodialysis and amount of fluid removed during hemodialysis.

There was no association between the level of muscle cramps and clinical variables such as co morbid condition, duration of disease, number of dialysis, pre dialysis weight, serum urea, serum creatinine, serum calcium and serum potassium.

Conclusion

As hemodialysis patients often experiences muscle cramps, it is necessary to provide non-pharmacological interventions to reduce muscle cramps. The findings of the study indicated that the Muscle Stretching Exercises are simple, practicable and effective intervention.

Recommendations:

- ✓ The study can be conducted by using a random sample to generalize the findings.
- ✓ Study can be replicated with patients from different settings.
- ✓ A comparative study can also be done between the effectiveness of other non-pharmacological measures and Muscle Stretching Exercise intervention.
- ✓ The effectiveness of Muscle Stretching Exercise can be evaluated for other conditions like evaluating muscle strength, quality of life, cardiopulmonary fitness, and ability to perform activities of daily living.

INDEX

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER-1

INTRODUCTION

"**Nurses dispenses comfort, compassion and care without a prescription"**

-Val Saintsbury

People's life style in developed and developing countries has changed considerably over the last few decades. Rapid changes in diet and lifestyles resulting from industrialization, urbanization, economic development and market globalization, have accelerated during the last decade. While standard of living has improved and the access to service has increased, there have also been significant negative consequences in terms of inappropriate dietary pattern and decreased physical activity and a corresponding increase in chronic diseases. Hence people suffer with number of chronic diseases; among this End Stage Renal Disease is a common chronic disease.

Kidney is a vital organ and the main function of the kidney is to remove waste products and excess water from the blood. The kidneys purify about 200 litres of blood every day and produce about two litres of urine. The waste products are generated from normal metabolic processes including the breakdown of active tissues, metabolism of proteins and other substances.

Renal disease is a silent killer which largely affects the quality of life. End Stage Renal Disease, involves progressive, irreversible destruction of the nephrons in both the kidneys which results in the retention of metabolic waste products in the blood.

The symptoms of worsening renal function are non-specific and might include feeling generally unwell and experiencing a reduced appetite. Often, End Stage renal disease is diagnosed as a result of screening of people known to be at risk of renal problems, such as those with high blood pressure or diabetes and those with renal calculi.

End Stage Renal Disease (ESRD) is identified by a blood test which is blood urea and serum creatinine. Higher level of creatinine indicates a lower glomerular filtration rate less than 15 ml / minute **(Black M.J, 2007)** and as a result a decreased capability of the kidneys to excrete metabolic waste products. Creatinine levels may be normal in the early stages of renal illness and the condition is discovered if urinalysis shows proteinuria or hematuria. To fully investigate the underlying cause of kidney damage, various forms of medical imaging, blood tests and often renal biopsy are employed to find out if there is a reversible cause for the kidney malfunction. Recent professional guidelines classify the severity of chronic renal disease in five stages, with stage 1 being the mildest and usually causing few symptoms and stage 5 being a severe illness with poor life expectancy if untreated. Stage 5 is often called End Stage Renal Disease (ESRD) and is synonymous with the now outdated term the **Chronic** Renal Failure (CRF).

End Stage Renal Disease (ESRD) is an important non communicable disease epidemic that affects the world population including India. **Rajan Ravichandran (2006)** reported that, 1.5 lakhs people suffered from End Stage Renal Disease (ESRD) in India. Severe decrease of renal function, either acute or chronic, is a threat for life **(Guyton & Hall, 2006).** ESRD usually develops uremic syndrome, which is a complex phenomenon leading to dysfunction of many organ systems in the body **(Himmelfarb, 2005).**

End stage renal disease represents a major problem for public health and it brings about complex implications to social and economic structures of every nation in the world. According to Kidney Wales foundation in UK, more than 500 million people worldwide and one in ten adults have some form of kidney damage. Too many people ignore the close inter-relationship between kidney diseases and diabetes or hypertension. Worldwide, 246 million people suffer from diabetes and expected that it will be 380 million by 2025. Diabetic nephropathy affects one third of people suffering from diabetes and approximately 1.5 million people worldwide are kept alive by renal dialysis.

In India the incidence of renal failure is increasing to higher rates. According to study conducted in India in 2010, almost 7.85 million people out of 1 billion population are suffering from chronic renal failure **(Matthew, 2012).**

As renal function declines, the disease ultimately reaches the life- threatening end stage which requires urgent dialysis therapy. The collaborative management for patients with End Stage Renal Disease is the treatment of the precipitating cause, fluid restriction (600 ml + previous 24 hours urine loss), nutrition therapy, measures to lower potassium, calcium supplementation, hemodialysis, peritoneal dialysis and renal transplantation.

The ultimate treatment of End Stage Renal Disease is dialysis. Dialysis helps to improve the health standards of the patients and thereby increases the life span into few more years. Now there are 2,164,000 patients worldwide who are undergoing dialysis as a treatment for ESRD. Out of that 1,929,000 patients are undergoing hemodialysis (89%) and 2, 35,000 is taking peritoneal dialysis (11%).

In India, only 16.2% of the End Stage Renal Disease (ESRD) patients are getting peritoneal dialysis whereas majority of ESRD patients receive hemodialysis.

Dialysis is used to correct fluid and electrolyte imbalances and to remove metabolic waste products accumulated due to declined renal functions. In hemodialysis, the blood, laden with toxins and nitrogenous wastes, is diverted from the patient to a machine, a dialyzer, where toxins are filtered out of blood and the blood is returned to the patient. Diffusion, Osmosis and Ultra filtration are the general principles of dialysis.

Hemodialysis is used for patients who are acutely ill and require short-term dialysis (days to weeks) and for patients with advanced ESRD who require long-term treatment for survival. Hemodialysis prevents death but does not cure renal disease and does not compensate for the loss of endocrine or metabolic functions of the kidneys. Hemodialysis is now a standardized therapy and used as a life-sustaining therapy for more than 300,000 patients in the United States who have End Stage Renal disease.

Most patients receive intermittent hemodialysis that involves treatments three times a week with the average treatment duration of 3 to 4 hours in an outpatient setting **(Smeltzer C.S et.al, 2012).**

Hemodialysis is the most common method used to treat advanced and permanent kidney failure. In recent years more compact and simpler dialysis machines have made dialysis increasingly attractive. But even with better procedures and equipment, hemodialysis is still a complicated and inconvenient therapy **(Amita Peter, 2012).**

The most common complications during hemodialysis, in descending order of frequency are hypotension (20-30%), muscle cramps (5-20%), nausea and vomiting (5-15%), headache (5%), chest pain (2- 5%), back pain (2-5%), itching (5%), and fever and chills (less than 1%) **(Sherman et al., 2007).**

Non specific physical symptoms are common in dialysis patients and the six most important symptoms of Hemodialysis patients are tiredness, muscle cramps, pruritus, dyspnea, headache and joint pain. **(Parfery, et al., 1988)**

According to **Holley (2008)**, muscle cramps occur in 33% to 86% of patients undergoing hemodialysis. These are painful, sustained involuntary contractions of skeletal muscle, mainly of the lower extremities. They result from rapid removal of sodium and water or from neuromuscular hypersensitivity **(Lewis.M. Sharon 2004).**

However, as they predominantly occur during the latter stages of a dialysis session, changes in plasma osmolality, sodium and excess fluid removal have been implicated **(Nicholas Constance, 2011).** Such muscle cramps are presumably related to reduction in muscle perfusion that occurs in response to hypovolemia, poor blood flow, compensatory vasoconstriction response that shunts blood centrally during dialysis.

During hemodialysis the individuals lie in bed with the leg in a relaxed position for four hours. A cramp pain typically lasts upto 10 minutes. The severity of pain varies. The muscle may remain tender for upto 24 hours after a leg cramp. They usually happen in last half of dialysis session.

Interrupting the muscle cramps and even preventing them is very important and it is predominantly the responsibility of the nurse, since the nurses take care of patients in the hemodialysis unit. **Dora Leung (2011),** Immediate gentle message on the cramping muscles, stand up if on lower limbs, stretching ,local heat / cold

application are the preventive exercise program targeted for the muscles prone to cramps.

Yaaghoobi et al. (2008), who studied 35 patients under hemodialysis and showed that isometric and isotonic exercise program for these patients cause prevention and decrease of muscle cramps. On the same way, **Daugirdas et al. (2007)** clarified that force stretching of the muscle involved (e.g., ankle flexion for calf cramping) may provide relief.

Muscle stretching exercises for the cramped muscle is the most effective treatment. Alternatively squeezing and releasing the cramped muscle may help. This mechanical kneading restores blood flow and generally helps relax the spasm and tightness.

Need for the Study:

The prevalence of End Stage Renal Disease (ESRD) is rising throughout the developed and developing countries mainly due to diabetes mellitus and hypertension.

There are currently 10, 65,000 people on hemodialysis worldwide (European dialysis and transplant nurses association / European renal care association journal, 2005). In India, 10 lakhs people suffer from kidney failure and more than four crores are at risk (Tamil Naidu kidney research foundation, 2006). In South India, an average of 500 patients registers for hemodialysis each year (Health Management Centre, 2005). In Government hospital nearly 40-50 patients undergo hemodialysis each day.

Hemodialysis is an important life maintenance treatment. Intradialytic complications are a constant threat for hemodialysis patients and dialysis staff **(Teta, 2008).** However, the complications of dialysis mostly contribute to under treatment.

Measures should be employed to improve the physical well being of the patients by reducing or preventing the complications associated with hemodialysis.

Almost all patients complain of muscle cramps at one or other time during dialysis usually of lower extremities that too of calf muscle. They are managed with normal saline infusion, simple calf massages and even by temporarily stopping the ultrafiltration till cramps go off. Some of them are prescribed cartinine preparations regularly for preventing muscle cramps.

An observational study reported a cumulative incidence of 86% during 14,000 Hemodialysis treatments in 103 patients. Elsewhere, Hemodialysis-associated muscle cramps have been found to affect 12% of patients. **(Hannah M.L et al. 2012, British Journal of Renal Medicine).**

Since cramps are a common occurrence, the discomfort leads to premature termination of the treatment, non compliance with the prescription and therefore underdialysis. Thus interfering with the muscle cramps and even preventing the occurrence become a major responsibility of the personal in charge of the patients. Since nurses are taking care of hemodialysis patients almost everywhere, it becomes the duty of the nurses.

Muscle cramps are prolonged involuntary muscle contractions. To relieve an established muscle cramp, one must passively stretch the contracting muscle. Prophylactic stretching of the particular muscle can also prevent attacks (Hansen, 2005).

In early days, physicians were the ones who prepared the equipment for hemodialysis, monitored the patient and terminated the treatment. It was not long before physicians began to rely on nurses to perform most of the patient care

decisions doing entire hemodialysis. Currently nurses carryout 20 to 100% of the technical functions and assume multiple roles such as care giver, dialysis technician and clinical decision making role.

The nurse plays an important role in the control and protection of the patient**.** Events and complications due to dialysis (especially sudden events through dialysis that can cause dangers such as death) can be prevented and patients' lives can increase with suitable care through the treatment period and appropriate nursing management with hemodialysis **(Brunner & Suddarth, 2008; Tabrizi et al. 2009).**

Muscle stretching exercises such as knee extension, supine hip abduction, hip flexion, dorsi flexion and plantar flexion of the feet are identified as effective cramp reduction methods after a thorough literature review.

However, only a few patients are able or willing to participate in exercises training and stretching which is organized on an outpatient basis. As a consequence, exercise programs are thought to be better incorporated into the dialysis service.

Based on the reviews of literature and the investigator's personal clinical experience in dialysis unit, the researcher found many of the patient developed muscular cramps. Hence the investigator wanted to help the patients undergoing hemodialysis by reducing muscle cramps with some interventions. So the investigator decided to do a study with muscle stretching exercises among patients undergoing hemodialysis so as to relieve the muscle cramps.

Statement of the Problem:

A study to assess the effectiveness of muscle stretching exercises on reduction of muscle cramps during hemodialysis among patients undergoing hemodialysis in selected hospitals at Thirunelveli.

Objectives:

4. To assess the pre - test and post - test level of muscle cramps among patients undergoing hemodialysis.
5. To find out the effectiveness of muscle stretching exercises on level of muscle cramps among patients by comparing pre and post intervention muscle cramp score.
6. To find out the association between the pre test level of muscle cramps and selected clinical variables among patients undergoing hemodialysis.

Hypotheses:

H_1: There is significant reduction of muscle cramps experienced by the patients after practicing muscle stretching exercises during hemodialysis.

H_2 : There is significant association between pre- test level of muscle cramps and selected clinical variables among patients undergoing hemodialysis.

Operational Definitions:

Muscle cramps:

It is the pathological discomfort reported by the patient regarding painful involuntary spasms of the thigh and calf muscles of patients during hemodialysis.

Hemodialysis:

It is a treatment employed for renal failure with exchange of plasma solute composition to dialysate solution using hollow fiber dialyzer.

Muscle stretching exercises:

These are the exercises performed by the patients for the thigh, lower leg and foot muscles - knee extension, supine hip flexion, supine hip abduction, plantar flexion and dorsi flexion. These exercises are performed during the hemodialysis for every 10- 15 minutes when the cramp occurs.

Effectiveness:

It refers to the significant reduction in the level of muscle cramps with practice of muscle stretching exercises.

Assumptions:

- The patients undergoing dialysis will experience muscle cramps.
- Muscle stretching exercises are effective in reducing the muscle cramp among patients undergoing hemodialysis.

Delimitations:

- This study will be delimited to the patients with End Stage Renal Disease undergoing hemodialysis in selected hospitals at Thirunelveli.
- Study is delimited to four weeks of data collection.

Conceptual framework:

The conceptual framework of this study is based on Modified Wiedenbach's Helping Art Clinical Nursing Theory (1964). The theorist's concept of Nursing, Person, Health and Environment are all interrelated to this central concept.

The conceptualization of nursing practice according to this theory consists of three steps.

- Step I - Identifying the need for help.
- Step II - Ministering the need for help.
- Step III - Validating the need for help

The factors included are Central purpose, Prescription and Realities.

Step - I: Identifying the need for help:

It determines the need for help based on the existence of a need. In this study it refers to the determination of the need for help is by the process of sample selection on the basis of inclusive and exclusive criteria.

Step - II: Ministering the needed help:

This refers to the provision of required help to fulfill the identified need. It has two components.

1. Realities
2. Prescription

Realities:

It refers to the physical, physiologic, emotional and spiritual factors that come into play in a situation involving nursing action. In this study it refers to the situation that influences the fulfillment of central purpose. It includes

- **Agent** - is the investigator.
- **Recipient** - patient with End Stage Renal Disease who are undergoing hemodialysis.
- **Goal** - reduction in muscle cramps level.
- **Means and activity** - muscle stretching exercises.
- **Framework** - hemodialysis unit.

Prescription:

It refers to the investigators plan of care or intervention to meet the client need. In this study it includes the muscle stretching exercises for those who experiencing muscle cramps during hemodialysis.

Step III: Validating the need for help

It refers to the collection of evidence that shows a client's needs have been met and one's functional ability has been restored as a direct result of the nurse's actions. In this study post assessment of cramp level was done and followed by analyzing the findings.

Summary

This chapter consisted of Background of the study, Need for the study, Statement of the problem, Objectives, Hypotheses, Operational definitions, Assumptions, Delimitation and conceptual framework.

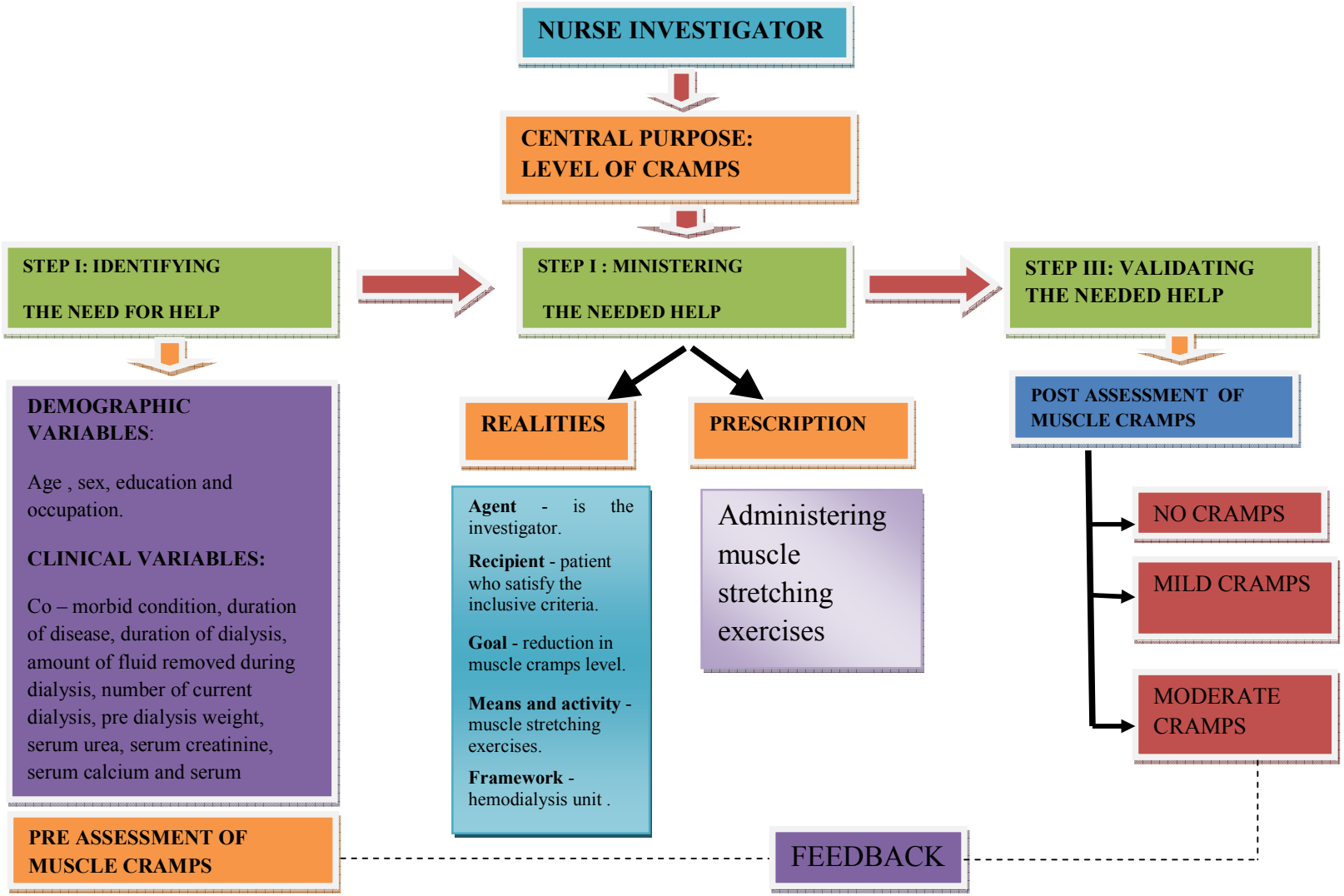

Fig: 1. Modified Wiedenbach's Helping Art Clinical Nursing Theory

CHAPTER II

REVIEW OF LITERATURE

The review of literature provides a basis for future investigations, justifies the need for replication, throws light on the feasibility of the study, indicates constraints of data collection and helps to relate the finding from one study to another with a view to establish a comprehensive body of scientific knowledge in a professional discipline.

In the present study the Literature review is arranged under the following headings:

1) Review related to occurrence of muscle cramps associated with hemodialysis.
2) Review related to the effectiveness of physical exercises during and before hemodialysis sessions.

Section I: Review related to occurrence of muscle cramps associated with hemodialysis:

Zolfaghari, M et al. (2015) conducted a study to compare the effects of two educational methods (family-centered and patient-centered) on reduction of two complications prevalent during dialysis (hypotension and muscular cramp) among the patients undergoing hemodialysis. The results of this research show that educating the active family members beside the patients on hemodialysis can be effective in reducing hemodialysis complications. The sample size was estimated to be 30 persons in each group after considering sample loss. Personal information of the patients included demographic information and information relating to disease. Observational

checklist was used for recording blood pressure and muscular cramp. Education was performed in two groups (patient-centered and family-centered) as face-to-face education on the bed of patients, considering the educational needs of patients in diet, physical exercise plan, and pharmaceutical program. Within 2 weeks of the study before intervention, the highest frequency of muscle cramp in both groups was same. But in the second and fourth weeks after intervention, family-centered education significantly reduced the frequencies of muscle cramp. So, in the family-centered group, 81.4% and 72.1% did not have the above complication in the second and fourth weeks after intervention, respectively, while in the patient-centered group, 60.3% and 60.3% of the patients had sudden muscle cramp in the second and fourth weeks after intervention, respectively. Tabrizi et al. percentage of muscle cramp significantly decreased from 50% to 6.7% with planned nursing care during dialysis ($P = 0.001$).

Patrick, G.L et al. (2014) conducted a study to evaluate the frequency and severity of muscle cramps, and the effect of dialysate magnesium on muscle cramps in 62 stable ESRD patients on chronic hemodialysis. Each subject was surveyed twice within a 6-month period. A single nephrology fellow conducted all in-person surveys. During the first survey, the patients were dialyzed with dialysate magnesium of 0.75 mEq/L (0.375 mmol/L). Prior to the second survey, the dialysate magnesium was increased to 1.0 mEq/L (0.50 mmol/L). The severity of cramps was scored on a 1–10 scale, with 10 indicating maximal severity. The number of patients with muscle cramps was significantly lower with dialysate magnesium of 1.0 meq/L (0.50 mmol/L) (56% versus 77%,). No significant difference was observed in Intradialytic weight gain, Intradialytic ultrafiltration, dry weight, or Intradialytic hypotension. The mean ± SD severity score of muscle cramps decreased. Seven of 31

(23%) patients in the group with low dialysate magnesium while 0/20 (0%) patients receiving high magnesium dialysate terminated hemodialysis early due to cramps. Both the number of patients reporting muscle cramps and the severity score decreased with higher dialysate magnesium which contributed to better adherence to hemodialysis treatments. In conclusion, muscle cramps in stable ESRD patient on HD are very common and lead to non adherence to HD treatment. The number of patients and severity of muscle cramps both decreased while the pre dialysis serum magnesium levels increased when dialyzed with a higher dialysate magnesium concentration. This may have contributed to better compliance with hemodialysis treatments. Further studies are needed to evaluate the efficacy and safety of higher dialysate magnesium concentrations in End Stage Renal Disease patients on hemodialysis with muscle cramps.

Salwa Abass A, Hassan, Amany Sobhy Sorour (2013) Despite hemodialysis effectiveness and it can prolong life indefinitely, patients suffer many intradialytic complications that may be life threatening. The aim of the present descriptive study was to assess nursing knowledge and practice regarding intradialytic complications. The study was conducted at two units, at the Urology and Nephrology Center in Mansoura City, Egypt. Two tools were used to conduct this study namely a self administered questionnaire to assess nurses' knowledge and observation checklist to assess nurse's practice regarding hemodialysis process and intradialytic complications. It indicated that (85%) of the studied nurses reported satisfactory high level of knowledge related to definition of hemodialysis, and (57.5%) had satisfactory knowledge about pre-session patient’s assessment. As regard the complications occur during hemodialysis the highest level of reported satisfactory knowledge related to hypotension, sepsis, anaphylaxis, cerebral disequilibrium syndrome and clotting

(85%, 72.5%, 65%, 65% and 60% respectively) while the low satisfactory level of nurses knowledge were related to blood loss, air embolism, muscle cramps and arrhythmias (47.5%,40 %, 37.5% and 25% respectively). Concerning total practice of hemodialysis, 64% of nurses who had adequate practices had satisfactory level knowledge and for the management of muscle cramps 51% of the nurses used stretching exercise to relieve cramp. Study results revealed that the most of them had satisfactory level of knowledge related to care of dialysis complications.

Holley.J.L (2011) Muscle cramps are a common complication of hemodialysis treatments, occurring in 33 to 86 percent of patients; they often result in the early termination of a hemodialysis session and are therefore a significant cause of underdialysis. Cramps occurring with dialysis treatment most commonly involve the muscles of the lower extremity, but the muscles of the hands, arms, and abdomen may also be affected. Cramps occur more often in older, diabetic, anxious patients. Low PTH values and high serum creatinine phosphokinase concentrations are also more frequent among patients with dialysis-associated cramps.

Sherman.R.A, Daugirdas.J, Ing.TS. (2007) conducted a double blind controlled trial study of acute therapy for hemodialysis related muscle cramps. Cramps were graded by the subjects as moderate or severe. Fifty milliliter doses of one three solutions were given intravenously in random fashion to 20 patients suffering a total of 100 episodes of muscle cramps. The solutions used were: 7.05%NaCl, 50% dextrose and 5% dextrose. Relief after three minutes was reported by the subjects as complete, partial or none. And the study results showed the complications during hemodialysis in descending order of frequency, hypotension (20-30%), cramps (5-20%), nausea and vomiting (5-15%), headache (5%), chest pain (2- 5%), back pain (2-5%), itching (5%), ad fever and chills (less than 1%) **.**

Brass, Adler, Siestema, et al.(2002) has done descriptive study on 122 patients on maintenance hemodialysis peripheral arterial disease was determined by measurement of ankle brachial index pre and post dialysis in lower extremities. Intradialytic cramps experience was assessed from history, 52.1% patients reported intradialytic cramps. Old age people were only 37.5% and it was inferred that there was no relationship between cramps during dialysis and peripheral arterial disease.

Pratee Pavanich (1999) studied 24 patients with nocturnal calf cramps. They are divided into two groups to quantitatively compare the effect of trigger point injection and oral quinine. The study was conducted for four weeks of the study parameters were cramp frequency, duration, pain intensity and cramp index. The outcome of all measures was found to be significantly better in group treated with trigger point injection. Results supported that gastrocremius trigger point was one cause of nocturnal calf cramps.

Denhaerynck et al .(2010) studied the incidence and results of failure to follow therapeutic program in patients under hemodialysis, 30-74% of the studied patients had muscle cramps and the reason was attributed to failure to observe therapeutic program based on limited fluids and dietary restriction.

Yun et al. (2008) conducted a study on the effect of family-centered interventions on patients with chronic kidney disease. They concluded that family-centered education significantly reduced hemodialysis complications, in addition to reduction of depression and increase of life satisfaction and self-care, so that it reduced the percentage of hypotension from 76.3% to 23% and muscle cramp from 56.4% to 23.5%.

Hadian et al. (2006) conducted a study on the effect of walking on the frequencies and intensity of muscle cramp in patients under hemodialysis and concluded that physical exercise and walking education significantly reduced muscle cramps (10 out of 12 patients did not have muscle cramp in the intervention group) (P = 0.01).

Naylor and Young (1994) surveyed a population of 218 patients and found out that the overall prevalence of muscle cramps was 37% and most commonly experienced in muscles of the leg, 83% cramps.

Dial (1978) studied 46 complete dialysis treatment sessions. Electromyographic (EMG) activity was recorded from a leg muscle in patients who had cramps. Results indicated that the mean muscle cramp latently from start of dialysis was 248 minutes and average cramp was 10 minutes in duration. Also tonic electromyographic activity in patients with muscle cramps showed a continued increased throughout the latter part of dialysis. This suggested that increase in electromyographic activity might be casually related to muscle cramps.

Section – II : Literature Review related to the effectiveness of physical exercises during and before hemodialysis sessions:

Kingsle Kishore Coumar M.F, Renuka. K, Nalini S.J.(2016) conducted a study with Quasi experimental one group pre-test post-test design to assess the effectiveness of Intradialytic Stretching Exercises on muscle cramp (pain) among patients undergoing hemodialysis in East Coast Hospitals at Puducherry. Through this study the investigator demonstrated Intradialytic stretching exercise to the patients before starting the hemodialysis. During Pretest the duration, occurrence and intensity of the muscle cramps (pain) was assessed during hemodialysis and Intradialytic

stretching exercises were given to the patients for about 15 minutes in both the lower extremities and the patients were reinforced to do the stretch exercises in the 1st and 2nd hour of hemodialysis. The results showed in assessment of pre-test and post-test level of muscle cramp(pain) among patients undergoing hemodialysis revealed that in pre-test 19(47.5%) having severe, 18(45%) moderate, 3(7.5%) mild muscle cramp respectively whereas in post test 3(7.5%) having severe, 11(27.5%) moderate,17(42.5%) mild and 9(22.5%) having no level of muscle cramp. Effectiveness of intra-dialytic stretching exercise on muscle cramp (pain) among patients undergoing were the mean value of 6.20 with standard deviation of 1.74 in the pre test was decreased to 3.02 in the post test after giving Intradialytic stretching exercise. The difference was found statistically significant at p value is <0.001 level and can be attributed to the effectiveness of intra-dialytic stretching exercise on muscle cramp (pain) among patients undergoing hemodialysis. The demographic variables such as educational status, family income per month, associated illness and duration of renal failure had association with muscle cramp (pain). The result shows that there was a significant reduction in muscle cramps of patients who had done stretching exercise.

Matthew.A, Latha.S (2014) conducted an evaluative approach; with one group pretest post design was used in the study. The study was conducted at K.S. Hegde hospital, Mangalore. The sample size was 40. Purposive sampling technique was used to select the subjects. WHO BREF scale and MAF scale was used to measure QOL and fatigue respectively. Intradialytic exercise was taught to the patients for the period of 30 minutes and after 4 weeks post- test was done. The overall findings of the study have shown that intradialytic exercise was effective in reducing the fatigue and improving the quality of life among dialysis patients, as

calculated t value (12.71 and 24.45) was greater than table value (t39=1.69) at 0.05 level of significance. There was a negative correlation between level of fatigue and quality of life (–0.504) at 0.05 level of significance. Study revealed that there was no significant association between the fatigue, QOL and selected variables. Exercise training in hemodialysis patients improves fitness, physical function, muscle strength and quality of life. Health professionals should provide appropriate treatment for patients who are experiencing fatigue in order to prevent any other complications that could arise.

Rezaei.J. et al. (2014) conducted a randomized clinical trial to assess the effect of regular exercise on depression in hemodialysis in Emam Reza Hospital,Iran. 51 hemodialysis patients were allocated in two groups. Beck Depression Inventory (BDI) scale was used to assessing depression rate in participants. Designed program was educated using poster and face-to-face methods for case group. Intervention was carried out three times a week for ten weeks. At the beginning and at the end of the study, depression rate of the subjects were assessed. According to the results of this study, there were no differences between case and control groups in depression rate at the beginning of the study, but there was significant difference after intervention (P = 0.016). In the beginning of the study, the mean and SD of depression in case group were 23.8 ± 9.29 and reduced to 11.07 ± 12.64 at the end ($P < 0.001$). The regular exercise program could reduce the depression in hemodialysis patients, therefore it is suggested for training this program for hemodialysis patients.

Watson E.L et al.(2014) this parallel randomized controlled feasibility study was conducted among chronic kidney disease (CKD) subjects in 20 controlled and 18 in experimental group with aim to determine the feasibility of delivering a supervised progressive resistance program in CKD, with secondary aims to investigate effects on

muscle strength and physical functioning. Patients in the exercise group undertook an 8 week progressive resistance exercise program consisting of 3 sets of 10 to 12 leg extension at 70% of estimated 1 repetition maximum thrice weekly. Patients in the controlled group continued with usual physical activity. Out of 2349 patients screened, 403 were identified as eligible and 38 enrolled in the study. 33 (87%) completed the study and those in the exercise group attended 92 % of training sessions. No changes were seen in controls for any exercise. Progressive resistance exercise increased muscle anatomical cross sectional area, muscle volume, knee extensor strength and exercise capacity. This type of exercise is well tolerated by patients with CKD and confers important clinical benefits.

Musavian et al. (2013) A quasi-experimental study was conducted to compare the effects of the active and passive intradialytic pedaling exercises on all eligible hemodialysis patients in the dialysis center of Akhavan Hospital in Kashan, Iran, from April to November 2013. In this center, 336 sessions of hemodialysis were performed for 120 patients with 28 dialysis apparatus every week. Results showed that intradialytic exercise for half an hour leads to positive changes. The exercise programs in this study increased the dialysis efficacy to 1.43 and this is obviously higher than the minimum acceptable efficacy. It appears that intradialytic exercise increases the muscle-blood flow and opens the capillary surface area that consequently would increase the leak of urea from the tissue to the vascular compartment and finally enhances the serum urea clearance and improves the dialysis efficacy. The present study showed that the passive exercise had better effects on dialysis efficacy than active exercise, especially at the end of the study.

Basemathmorris (2012) conducted a study with one group pretest post test quasi experimental design to assess the effectiveness of Intradialytic exercise on muscle cramps among patients undergoing hemodialysis. The study was conducted among 45 patients undergoing dialysis. Muscle cramps were measured using muscle cramp tool. Results indicated that there was significant difference in the mean level of muscle cramps before and after intervention. The mean level of muscle cramps in the pretest and post test was 8.16 and 2.78 respectively with 't' value 21.975 at 'p'<0.001. Finally it concluded that intra dialytic stretching exercises could alleviate the muscle cramps.

Bulckaen.M et al. (2011) conducted a prospective, controlled, nonrandomized intervention study to evaluate the effects of different 6-month programs of physical activity in 18 patients of a single hemodialysis unit. Exercise training is beneficial for hemodialysis patients, but it should be tailored to individual abilities and willingness to participate. This study Before and after a 12-month control period (T_0), and following 3 (T_3) and 6 (T_6) months of training, the patients underwent the 6-minute walk test (6MWT) and constant treadmill test at 3 km/hour speed and 10% grade; spontaneous physical activity was assessed by pedometers. All patients trained for coordination, flexibility and muscular strengthening for 30 minutes within the first 2 hours of hemodialysis sessions: 9 patients underwent home exercise walking training (advised walking group [AWG]); the other 9 patients underwent the advised home training program plus an additional supervised gym training session, twice weekly (supervised walking group [SWG]). In both AWG and SWG, no changes occurred during the control period (232 ± 204 m and 248 ± 187 m at T0). In contrast, endurance performance at treadmill increased at T_3 and T_6 in the AWG (377 ± 272 m and 615 ± 413 m; $p<0.01$) and in the SWG (424 ± 272 m and 890 ± 364 m; $p<0.001$).

No unwanted side effects occurred. This study shows that physical exercise programs can safely increase physical performance in hemodialysis patients. The training program should be continued for at least 6 months to increase muscle strength and endurance. Intradialytic exercise and home-based, pedometer-based regimens may be a useful and easy approach, whereas supervised programs can give additional benefits in motivated, selected patients.

Tae-Du Jung and Sun-Hee Park (2011) conducted a experimental study which aimed to investigate the beneficial effects of exercise during hemodialysis in Kyungpook National University Hospital, Korea. Muscle strength in ESRD patients on hemodialysis is weaker than that in normal populations with a sedentary lifestyle. A previous study showed that isokinetic muscle strength was an important determinant of VO_{2peak} in patients on dialysis. Therefore, an intradialytic exercise program including resistance exercise could be beneficial in ESRD patients on hemodialysis. Various resistance exercise programs are available for ESRD patients during hemodialysis: seated knee extension, supine hip flexion, supine hip abduction, supine straight-legged raise, and seated leg curl for lower extremity strengthening. There also other exercises for strengthening upper extremity and abdomen. All resistance exercises can be applied to the patients in a supine or a sitting position. Intradialytic exercise programs are superior to interdialytic exercise programs in terms of a lower dropout rate. Exercise is one of the possible preventive maneuvers to reduce muscle protein loss and maintain muscle function. . Aerobic and resistance exercise are beneficial not only in improving physical functioning, including maximal oxygen uptake and muscle strength, but also in improving anthropometrics, nutritional status, hematological indexes, inflammatory cytokines, depression, and health-related quality of life.

Chen et al. (2010) conducted a randomized study which aimed to evaluate physical performance using "Short Physical Performance Battery (SPPB) Score" if the patients were fit after 24 sessions. Another aim of the study was to evaluate body composition, lower body strength and quality of life on 50 patients with a mean age of 69 ± 13 years who received long term dialysis (3.7 ± 4.2 years) and divided the patients into low intensity strengthening exercise and stretching exercises (control group) groups. The measurements were repeated at 36 session (post) and 48 session (final) apart from 24 session (mid). Exercise sessions took place twice weekly during the second hour of hemodialysis for a total of 48 exercise sessions. Supervised sessions began with a 5-min warm-up and ended with a 5-min cool-down. Participants in the strength training group exercised their lower body only using ankle weights progressively in half-pound increments from 0.5 to 20 lbs (TKO,Houston, TX). Exercises included seated right/left knee extension with dorsi/plantar flexion (quadriceps muscle), seated leg curl with both legs keeping the heels pressed firmly against a chair while rolling the legs in and out (hamstrings), semi recumbent right/left inner leg raises (hip adductors), and semi recumbent dorsi/plantar flexion with straight legs (tibialis anterior, gastrocremius and soleus muscles). Participants did a seated pelvic tilt (abdominal and lower back muscles) without using free weights. Two sets of eight repetitions were performed for each exercise with a 1.5s concentric phase, a 0.5s pause in the lifted position and a 3-s eccentric phase; assuring 1–2 min rest between sets. The study results showed that stretching exercises can be done at home settings as it is cost effectiveness and it improves lower body strength and quality of life.

Mohamed.M, Ahmed.A, Zead.S.A, (2007) conducted a Quasi- experimental study to determine the effect of a stretching exercises protocols on reduction of leg cramp during hemodialysis among chronic renal failure patients' **.**This study was conducted in kidney dialysis department of Assuit University hospitals .The subjects of this study consists of 60 patient with muscle cramps during hemodialysis. Three tools included in the study , tools of socio – demographic data , tools of patient information about muscle cramps and management & tool of evaluated patient knowledge & skills after performance exercises. Results showed that there was lack of knowledge & skills related to muscle cramps before nursing instruction protocol. As regarding patient information about non – drug management of muscle cramps, it revealed that the majority of patient (93.4 %) didn't gain any information about management of muscle cramp. But there was high statistical significant difference between before & after– nursing instruction as regard exercises 8.3% & 55.0% respectively $P<0.001$ %, as regard important of exercises, performance of exercises and number of pain occurs after exercises after performance of exercises . So the study recommended that the importance of performance of stretching exercises for patient before dialysis to prevent cramps.

Turney (2006) published that the severe muscle cramps are experienced near end of the dialysis treatment. He suggested trying a program of gentle stretching and toning exercises targeted at the muscles which tend to cramp during dialysis.

Storer, Casaburi, Sawelson, et al. (2005) studied 12 maintenance hemodialysis patients by providing them incremental and constant work rate cycle exercises for 6-8 weeks and found out that eight weeks of leg cycling during

hemodialysis in maintenance patients improves not only cardiopulmonary fitness and endurance but also muscle strength, muscle power fatigability and physical function.

Hansen (2005) published a treatment protocol for cramps in end stage renal disease which concluded that to relieve an established cramp, one must passively stretch the contracting muscle. In some cases, this could be accomplished by simple walking around which produced a relative dorsiflexion of foot. Prophylactic stretching can also prevent attacks, as positions in bed might prevent foot dorsiflexion.

Banerjee, Kong and Farrington (2004) studied two groups of 10 patients in each by exercising them sub maximally using a stationary cycle during isovolemic dialysis for 10 minutes rest and again 10 minutes of exercises. Cardiac output, peripheral resistance, blood volume and stroke volume were measured using ultrasound dilution and concluded that the hemodialysis response to exercises during hemodialysis is comparable with that in normal individuals.

Rizzeoli, Cerretano, Normanno, et al.(2004) did a study in eight patients who participated in physical training with motorized cycle during dialysis treatment. The study suggested that exercises during dialysis treatment was safe and consented either better psychosocial performance or better dialytic efficiency.

Depaul.V, Moreland.J, Eager.T, Clase.C.M (2002) A study was conducted to find the effectiveness of aerobic and muscle strength training in patients receiving hemodialysis using single-blind, randomized, controlled trial of an exercise intervention in hemodialysis patients at Canada. The intervention consisted of progressive resisted isotonic quadriceps exercises, hamstrings exercise and training on a cycle ergometer three times weekly for 12 weeks. Individuals in the control group

underwent a nonprogressive program of range-of-motion exercises. Both group were observed for an additional 5 months without intervention. Outcomes were assessed at baseline, 12 weeks, and 5 months. The conclusion of the study showed that the exercise program improved physical function of the patient.

Cappy, Jablonka and Schroedes (1999) studied 32 hemodialysis patients who participated in a progressive self faced exercise program including cycling before or during hemodialysis or walking on treadmill before hemodialysis. Patients also had the option of doing stretching and light weight exercises during hemodialysis. They were assessed after duration of 3.6 and 12 months of participation for physical strength, weight, blood pressure, electrolytes, hematocrit, glucose and intradialytic cramping. Result showed that all patients had improvement in measures of physical performance.

Ridley, Hoey and Ballagh-Hoves (1999) conducted a quasi experimental one group pre and post test design study to assess physical capacity, quality of life and ability to perform activities of daily living among eight subjects completed a 12 week exercise program involving warm-up, stretching, strengthening and cardio vascular training. The result demonstrated improvements in participants, physical capacity, quality of life and ability to perform activities of daily living. They concluded that an exercise during dialysis, program was safe and had the potential to result in positive patient outcomes.

Schwellnus (1997) described that during muscle cramps, electromyographic activity was high and passive stretching was effective in reducing this stretching relieved cramp by probably invoking the inverse stretch reflex. Stretching also invoked afferent activity from golgi-tendon organ to relieve cramps.

CHAPTER III

RESEARCH METHODOLOGY

Research methodology includes the steps, procedures and strategies for gathering and analyzing data in the research investigation.

This chapter consists of research approach, research design, variables, setting of the study, population, sample, sample size, sampling technique, criteria for selection of sample, development and description of the tool content validity, reliability, pilot study, data collection procedure and plan for data analysis.

Research Approach

A Quantitative approach was used to determine the effectiveness of muscle stretching exercises on reduction of muscle cramps during hemodialysis among patients undergoing hemodialysis.

Research Design

Quasi experimental research - **One group pre-test and post-test design**

GROUP	PRE-TEST	INTERVENTION	POST-TEST
Experimental	O_1	X	O_2

- O_1 - Pretest assessment of muscle cramps.
- O_2 -Post test assessment of muscle cramps.
- X - Practice of muscle stretching exercises.

Setting of the Study:

The setting of the study refers to the area where the study was conducted. The study was conducted in 150 bedded Shifa Hospital and 100 bedded Galaxy hospital, Thirunelveli District. Each comprises of various functioning departments like Emergency department, IMCU, ICCU and surgical units, medical and surgical wards, and operation theatre. Each has a separate Dialysis unit. The Hospitals were situated at a distance of 40 kilometres from Nehru Nursing College. The settings were chosen on the basis of feasibility, availability of adequate sample and the familiarity of the investigator with the setting.

Variables:

Independent Variable

In this study the independent variable was

- Muscle stretching exercises

Dependent Variable

In this study the dependent variable was

- Muscle cramps

Population:

- ❖ The Target population was End Stage renal Disease (ESRD) patients, having muscle cramps during hemodialysis.
- ❖ The Accessible population comprised of ESRD patients having muscle cramps during hemodialysis in Shifa and Galaxy hospitals.

Sample:

Samples consist of patients undergoing hemodialysis, who fulfill the inclusive criteria in Shifa and Galaxy hospital.

Sample Size

Total sample size was 30 patients having muscle cramps during hemodialysis.

Sampling Technique

Convenient sampling technique was used in this study.

Criteria for Sample Selection

Inclusion Criteria

- Patients who are diagnosed as End Stage Renal Disease undergoing hemodialysis.
- Patients with the age group of 40 – 60 years.
- Patients who reports discomfort of muscle cramps.

Exclusion Criteria

- Patients with parathyroid disorders.
- Patients with femoral vein catheterization.
- Patients with musculoskeletal deformities like lower limb fracture, osteoarthritis and congenital disorders.
- Patients with varicose veins.

Development and description of the tool:

The tool was developed after extensive review of literature, internet search and expert opinion to select the suitable scale to assess the muscle cramp level among patients undergoing hemodialysis.

Part I: Demographic variables and clinical variables of patients

- **Section A:** It consists of demographic data - 4 items seeking information about age, sex, education and occupation.
- **Section B:** It consists of clinical variables - 10 items seeking Clinical variables such as co – morbid condition, duration of disease, duration of dialysis, amount of fluid removed during dialysis, number of current dialysis, pre dialysis weight, serum urea, serum creatinine, serum potassium and serum calcium level.

Part II: Modified muscle cramp assessment tool:

Assessment tool consists of four items and with five point scale grading from 0 – 4.

Scoring Key

1) No cramps : 0
2) Mild cramps : 1-4
3) Moderate cramps: 5-10
4) Severe cramps: 11-16

Validity

Validity refers to the degree to which an instrument measures what it is supposed to measure. The content validity of the tool was established on the basis of opinion of one medical expert and five nursing experts in the field of Medical Surgical Nursing and modification was done as per the suggestion of the experts in the tool.

Reliability:

Reliability of the tool was tested by the investigator. The reliability of the tool was determined by interrater method. The reliability score was r = 0.92.

Intervention Technique:

Muscle Stretching Exercises:

1. **Knee Extension (Sitting Position)**
   - ❖ Begin with both knees bent.
   - ❖ Keeping the client's thigh on the bed, straighten out the knee as slowly kick up.
   - ❖ Hold this position for 5 seconds.
   - ❖ Slowly return the knee to the fully bent position.
   - ❖ Repeat 10 times on each leg.
2. **Supine Hip Abduction (Lying Down Position):**
   - ❖ Lie down lying on back with legs straightened.
   - ❖ Slowly move one leg out to the side while keeping the knee straight.
   - ❖ Slowly return to the starting position.

- ❖ Repeat 10 times on each leg.

3. **Supine Hip Flexion (Lying Down Position):**
   - ❖ Flex both knees and move the knees towards chest as far as possible.
   - ❖ Slowly straighten the legs and come to starting position.
   - ❖ Repeat 10 times slowly.
4. **Dorsi Flexion And Plantar Flexion(Sitting Position):**
   - ❖ Should begin with feet resting on the floor or supported on a very low stool.
   - ❖ Dorsi flexion – move the foot towards your body.
   - ❖ Plantar flexion – move the foot away from your body.
   - ❖ Repeat 10 times on each leg.

Pilot Study:

It is a rehearsal for the main study. A formal permission was obtained from The Medical Director of Galaxy Hospital, Thirunelveli. The Pilot study conducted for a period of one week. Rapport was established and brief introduction about the study was given. The sample size was five. The samples were selected by means of convenient sampling technique and consent was obtained from each sample. Pre-test score was assessed by using muscle cramp assessment scale. The data were collected approximately for 1- 2 study subjects per day. The results of the pilot study showed that the patients having muscle cramps during hemodialysis who received muscle stretching exercises reported reduction of cramps. The intervention was found to be feasible and was decided to be followed in the main study. The samples selected for the pilot study were not included for the main study.

Data Collection Procedure

- Formal written permission obtained from the Director of Shifa and Galaxy Hospital, Thirunelveli. 30 patients having muscle cramps during hemodialysis were selected by using convenient sampling method. Rapport was established with the patients and brief introduction about the study was given. Consent was obtained from each patient. Pretest data was collected using demographic and clinical variables and the intensity and frequency of muscle cramps were assessed with Muscle Cramp Assessment Tool and the investigator demonstrated muscle stretching exercises for subjects who were recognized based on the sample selection criteria for 5 minutes and obtaining return demonstration on one to one basis before the start of hemodialysis. During hemodialysis, pre test muscle cramp assessment was done using muscle cramp assessment tool and the client was asked to do the previously taught muscle stretching exercises. After doing muscle stretching exercises, the effect of the exercises were also identified using Muscle Cramp Assessment Tool.

Plan for Data Analysis:

After the data collection, data were organized, tabulated, summarized and analyzed. The data were analyzed according to the objectives of the study by using descriptive and inferential statistics.

Descriptive Statistics

- Frequency and percentage distribution were used to analyze the demographic data and clinical data .
- Frequency and percentage distribution was used to assess the pre and post test level of muscle cramps.

Inferential Statistics

- Paired 't' test was used to assess the effectiveness of muscle stretching exercises in terms of reduction of muscle cramps among patients undergoing hemodialysis.
- Chi-square test was used to find out the association of the clinical variables with level of muscle cramps among patients undergoing hemodialysis.

Ethical Consideration:

Research proposal was approved by the dissertation committee, prior to the pilot study and main study. The researcher got permission from Principal, Head of the department of Medical Surgical Nursing and Research ethical committee of Nehru Nursing College, Vallioor. A formal permission was obtained from the Medical superintendent and Director of Shifa and Galaxy Hospital, Thirunelveli. Rapport was established with the patients undergoing dialysis and a brief introduction about the study was given. Consent was obtained and reassurance was provided to patients. During the data collection period, the study subjects had no adverse effects because of the intervention of muscle stretching exercises.

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis of the data interpretation of the data collected from the samples to assess the effectiveness of muscle stretching exercise on reduction of muscle cramps among patients undergoing hemodialysis.

Analysis is the method of organizing, scrutinizing and sorting the data in such a way that research questions can be answered. **Polit, Hungler (2009)**

The data was computed by using descriptive (mean, frequency, percentage distribution and standard deviation) and inferential ('t' test and chi square test) statistics.

Organization of data:

Section A: Description of demographic and clinical variables of samples:

- Frequency and percentage distribution of samples based on demographic variables.
- Frequency and percentage distribution of samples based on clinical variables before the intervention.

Section B: Determine the level of muscle cramps with practice of muscle stretching exercise intervention

- Assessment of pre-test and post-test level of muscle cramps among patients undergoing hemodialysis.
- Paired 't' test determination of level of muscle cramps among patients undergoing hemodialysis.
- Association of pre-test level of muscle cramps with clinical variables among patients undergoing hemodialysis.

Section A

Description of demographic variables

Table: 1 Frequency and Percentage Distribution of Demographic Variables among sample subjects

n = 30

S.No	Demographic Variables	Frequency	Percentage (%)
1.	**Age**		
	a) 40 - 45 years	8	26.70
	b) 46- 50 years	6	20.00
	c) 51- 55 years	7	23.30
	d) 56- 60 years	9	30.00
2.	**Gender**		
	a) Male	16	53.30
	b) Female	14	46.70
3.	**Education :**		
	a) Illiterate	10	33.30
	b) Only school	8	26.70
	c) Diploma / degree	7	23.30
	d) Post graduate	5	16.70
4.	**Occupation**		
	a) Government employee	5	16.70
	b) Semi-government employee	6	20.00
	c) Private employee	10	33.30
	d) Coolie	9	30.00

Table No 1 denotes, Majority of the sample subjects 9 (30%) were in the age group above 61 years, 8 (26.7%) were in the age group of 40-45 years, 7 (23.3%) were in the age group of 51- 60 years and 6(20%) were in the age group of 46-50 years.

Out of total sample subjects, the majority of the samples 16 (53.3%) were males and 14 (46.7%) of them were females.

Based on the educational status, majority of the sample subjects 10(33.3%) were illiterate, 8 (26.70%) samples have attended only school, 7(23.3%) were diploma/degree holders and 5 (16.70%) were post graduates.

Based on the occupation, the majority 10 (33%) samples were private employee, 9 (30%) were coolie, 6 (20%) samples were semi government employee and 5(16.70%) samples were government employee.

Description of Clinical variables

Table: 2 Frequency and Percentage Distribution of Clinical Variables among sample subjects before the intervention

n=30

S.No	Clinical variables	Frequency	Percentage (%)
1.	Co – morbid condition		
	a) Diabetes	6	20.00
	b) Hypertension	9	30.00
	c) Diabetes& hypertension	10	33.30
	d) Any other	5	16.70
2.	Duration of disease		
	a) Less than or equal to 6 months	6	20.00
	b) 7 - 12 months	8	26.70
	c) 13 - 36 months	12	40.00
	d) 37 - 60 months	4	13.30
3.	Duration of dialysis		
	a) 2 hours	0	0.00
	b) 3 hours	0	0.00
	c) 4 hours	19	63.30
	d) 5 hours	11	36.70
4.	Amount of fluid removed during dialysis		
	a) 1 litre	0	0.00
	b) 2 litres	0	0.00
	c) 3 litres	14	46.70
	d) 4 litres	16	53.30

n = 30

S.No	Clinical variables	Frequency	Percentage (%)
5.	No. of current dialysis		
	a) 1 - 20 times	8	26.70
	b) 21 - 30 times	12	40.00
	c) 31 - 40 times	6	20.00
	d) More than 40 times	4	13.30
6.	Pre dialysis weight		
	a) Less than or equal to 40 kg	5	16.70
	b) 41 - 50 kg	6	20.00
	c) 51 - 60 kg	5	16.70
	d) 61 - 70 kg	7	23.30
	e) More than 70 kg	7	23.30
7.	Serum Urea		
	a) 20 – 40 mg/dL	0	0.00
	b) 41 – 80 mg/dL	8	26.70
	c) 81 – 120 mg/dL	16	53.30
	d) More than 120 mg/dL	6	20.00
8.	Serum Creatinine		
	a) 0.6 – 1.4 mg/dL	5	16.70
	b) 1.41 – 2 mg/dL	6	20.00
	c) 2.1- 5 mg/dL	7	23.30
	d) More than 5 mg/dL	12	40.00

n = 30

S.No	Clinical variables	Frequency	Percentage (%)
9.	Serum Calcium		
	a) 6- 8.5 mg/dL	12	40.00
	b) 8.6- 10 mg/dL	10	33.30
	c) 10.1- 15 mg/dL	8	26.70
	d) More than 15 mg/dL	0	0.00
10.	Serum Potassium		
	a) 2.5- 3.4 mEq/L	8	26.7
	b) 3.5- 5 mEq/L	14	46.70
	c) 5.1- 8 mEq/L	7	23.30
	d) More than 8 mEq/L	1	3.30

Table No 2 denotes that majority of the sample subjects 10 (33.3%) had both diabetes and hypertension, 9 (30%) sample subjects had only hypertension, 6 (20%) had only diabetes.

Regarding duration of disease, the majority 12 (40%) falls in between 13 - 36 months, 8 (26.7%) falls in between 7 – 12 months.

Regarding duration of dialysis, the majority 19 (63.3%) had 4 hours session and 11 (36.7%) had 5 hours session.

Based on the amount of fluid removed during dialysis, 4 litres fluid were removed in 16 (53.3%) persons and 3 litres fluid were removed in 14 (46.7%) persons.

Based on the number of current dialysis, the majority 12 (40%) have undergone 21 – 30 times, 8 (26.7%) have undergone 1 – 20 times, and 4 (13.3%) have undergone more than 40 times.

Regarding pre dialysis weight, 14 (46.67%) of the sample subjects were more than 61 kg and 10 (33.33%) samples were less than 51 kg.

Regarding serum urea level, the majority 16 (53.3%) persons had 81 – 120 mg/dL, 8(26.7%) samples had 41 – 80 mg/dL, and 6(20%) samples had more than 120 mg/dL.

Regarding serum creatinine level, the majority 12(40%) persons had more than 5 mg/dL and the 5(16.7%) persons had 0.6 – 1.4 mg/dL.

Regarding serum calcium level, the majority 12 (40%) sample subjects had 6 – 8.5 mg/dL, 10 (33.3%) had normal calcium level and 8 (26.7%) sample subjects had 10.1 – 15 mg/dL.

Regarding serum potassium level, the majority 14 (46.7%) had normal potassium level, 8 (26.7%) of the samples had low potassium level and 8 (26.7%) of them had high potassium level.

SECTION B

Determine The Level Of Muscle Cramps With Practice Of Muscle Stretching Exercises

Table 3: Assessment of pre test and post test level of muscle cramps among patients undergoing hemodialysis. n= 30

S.No	Level of muscle cramps	Pre test		Post test	
		F	%	F	%
1	No cramps	0	0.00	14	46.67
2	Mild cramps	0	0.00	16	53.33
3	Moderate cramps	18	60.00	0	0.00
4	Severe cramps	12	40.00	0	0.00
	Total	30	100.00	30	100.00

Table 3 shows that in the pre-test majority of the samples 18 (60.00%) had moderate level of cramps and 12 (40.00%) had severe level of cramps.

Where as in the post test, majority of the samples 16 (53.33%) had mild level of cramps and 14 (46.67%) had no muscle cramps.

It could be inferred that muscle stretching exercises intervention relieved muscle cramp during hemodialysis.

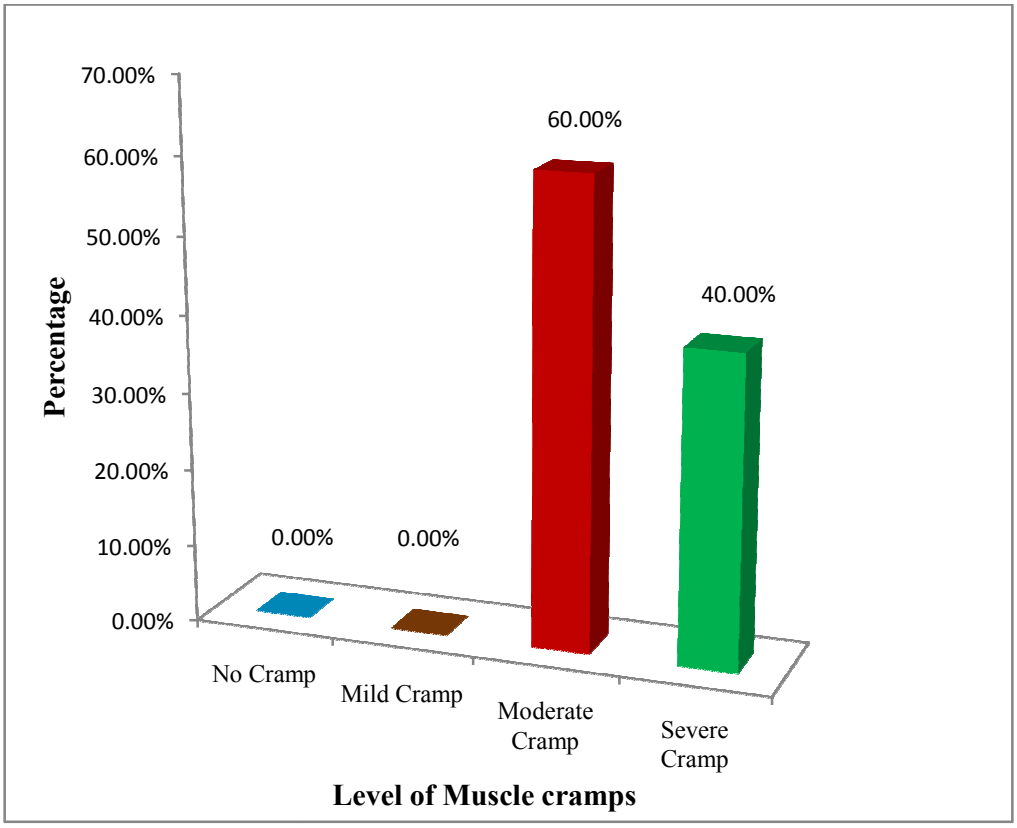

Figure 2: Frequency distribution of pre test level of muscle cramps during hemodialysis

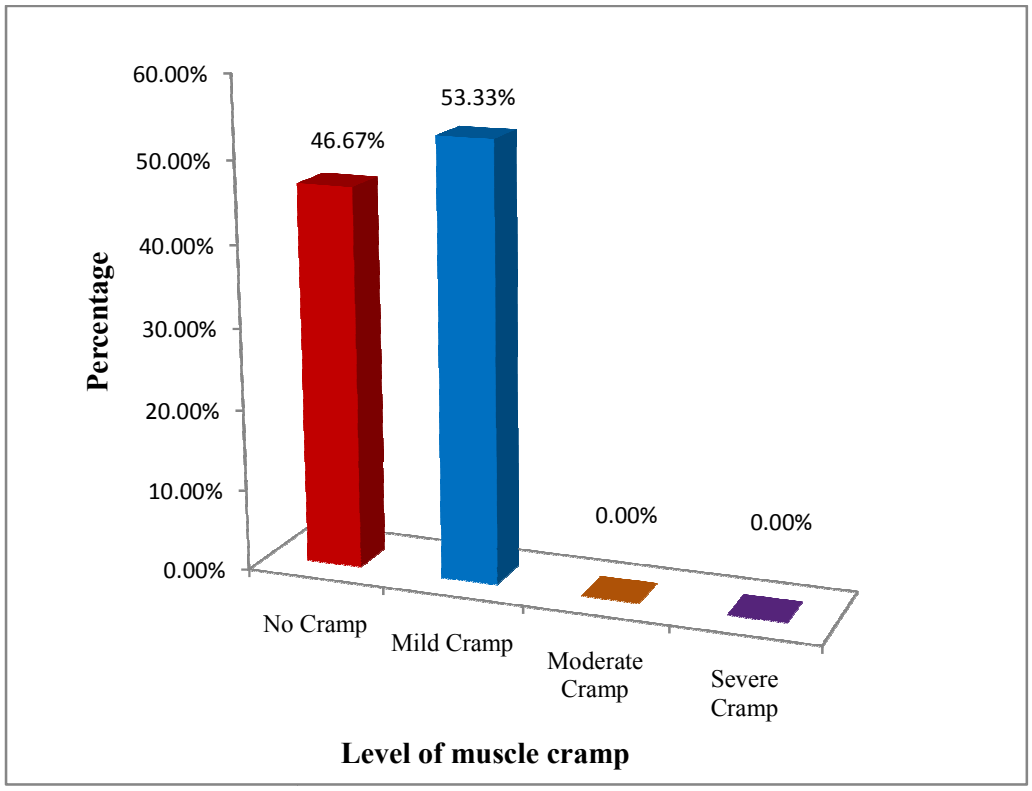

Figure 3: Frequency distribution of post test level of muscle cramps during hemodialysis.

Table 4: Paired 't' test determination of level of muscle cramps among patients undergoing hemodialysis

n = 30

Test	Mean	Standard Deviation	Mean Difference	't' Value	Table Value
Pre test	11.5	3.26	9.74	15.70 (S)	29 df 2.042
Post test	1.76	1.03			

S - Significant at 0.05 level

Data from Table: 4 has indicated that the calculated't' test value 15.70 was more than the table value of 2.042. Hence it could be inferred that muscle stretching exercises were very much effective in reducing the muscle cramps occurring during hemodialysis. The research hypothesis, "There is significant reduction of muscle cramps experienced by the patients after practicing muscle stretching exercises during hemodialysis" was accepted.

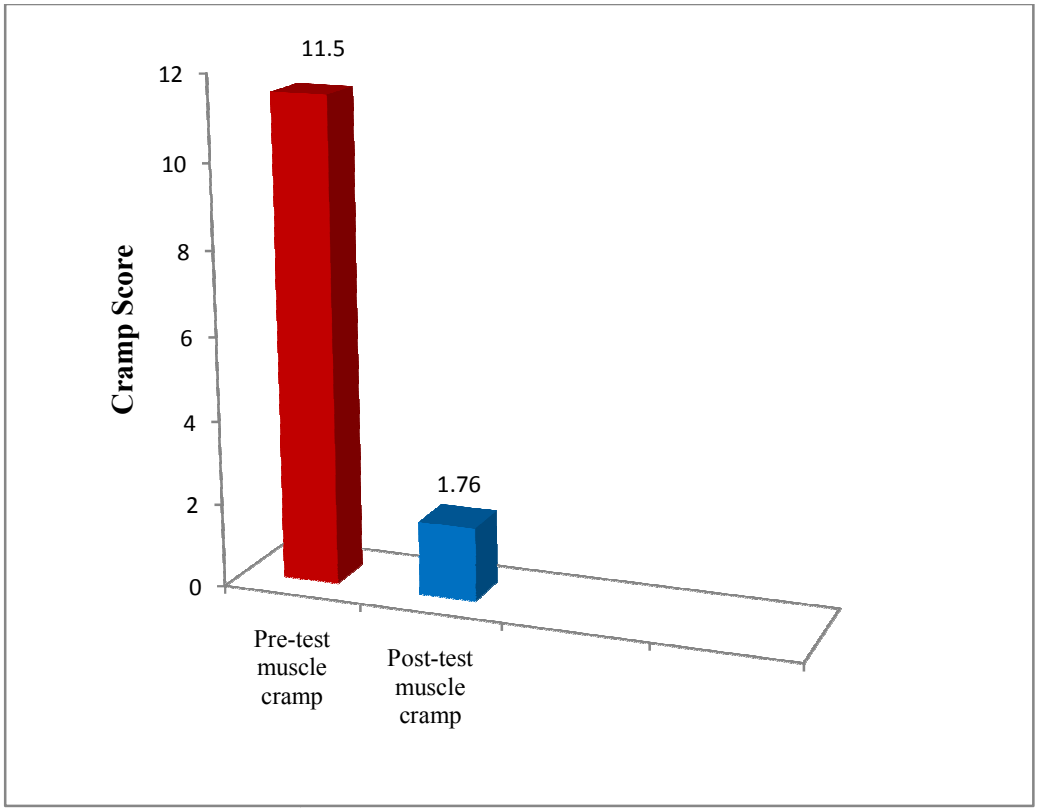

Figure 4 : Mean muscle cramp score among patients undergoing hemodialysis

Table 5: Association between the pre-test level of muscle cramp with clinical variables of the patients undergoing hemodialysis

n=30

S.No	Variables	Level of cramps			Chi square ($\chi 2$)	Table value
		Moderate cramps	Severe cramps	Total		
1.	Co – Morbid condition					
	a) Diabetes	4	2	6		
	b) Hypertension	5	4	9	3.00	3 df
	c) Diabetes & hypertension	4	6	10	(NS)	7.82
	d) Any other	5	0	5		
2.	Duration of disease					
	a) Less than or equal to 6 months	4	2	6		
	b) 7- 12 months	4	4	8	2.90	3 df
	c) 13- 36 months	9	3	12	(NS)	7.82
	d) 37- 60 months	1	3	4		
3.	Duration of dialysis					
	a) 2 hours	0	0	0		
	b) 3 hours	0	0	0	5.46	1 df
	c) 4 hours	14	5	19	(S)	3.84
	d) 5 hours	4	7	11		

NS--- Not Significant , S--Significant at 0.05 level

n = 30

S.No	Variables	Level of cramps			Chi square ($\chi 2$)	Table value
		Moderate cramps	Severe cramps	Total		
4.	Amount of fluid removed during dialysis					
	a) 1 litre	0	0	0		
	b) 2 litres	0	0	0	4.29	1 df
	c) 3 litres	12	2	14	(S)	3.84
	d) 4 litres	6	10	16		
5.	Number of current dialysis					
	a) 1- 20 times	5	3	8		
	b) 21- 30 times	6	6	12	3.09	3 df
	c) 31- 40 times	3	3	6	(NS)	7.82
	d) More than 40 times	4	0	4		
6.	Pre dialysis weight					
	a) Less than or equal to 40 kg	5	0	5		
	b) 41- 50 kg	4	2	6		
	c) 51- 60 kg	2	3	5	2.65	4 df
	d) 61- 70 kg	3	4	7	(NS)	9.49
	e) More than 70 kg	4	3	7		

NS--- Not Significant , S--Significant at 0.05 level

n=30

S.No	Variables	Level of cramps			Chi square ($\chi 2$)	Table value
		Moderate cramps	Severe cramps	Total		
7.	Serum Urea					
	a) 20- 40 mg/dL	0	0	0		
	b) 41- 80 mg/dL	4	4	8	0.50	2 df
	c) 81- 120 mg/dL	10	6	16	(NS)	5.99
	d) More than 120 mg/dL	4	2	6		
8.	Serum Creatinine					
	a) 0.6- 1.4 mg/dL	5	0	5		
	b) 1.41- 2 mg/dL	4	2	6	2.70	3 df
	c) 2.1- 5 mg/dL	4	3	7	(NS)	7.82
	d) More than 5 mg/dL	5	7	12		
9.	Serum Calcium					
	a) 6- 8.5 mg/dL	6	6	12		
	b) 8.6- 10 mg/dL	5	5	10	2.89	2 df
	c) 10.1- 15 mg/dL	7	1	8	(NS)	5.99
	d) More than 15 mg/dL	0	0	0		

NS--- Not Significant , S---Significant at 0.05 level

n=30

S.No	Clinical Variables	Level of cramps			Chi Square ($\chi 2$)	Table value
		Moderate cramps	Severe cramps	Total		
10.	Serum Potassium					
	a) 2.5- 3.4 mEq/L	4	4	8		
	b) 3.5-5 mEq/L	10	4	14	1.60	3 df
	c) 5.1-8 mEq/L	4	3	7	(NS)	7.82
	d) More than 8 mEq/L	0	1	1		

NS---- Not significant, S---- Significant at 0.05 level

Table 5 indicated that there was an association between the level of muscle cramp and the variables such as duration of hemodialysis and amount of fluid removed during hemodialysis.

There was no association between the level of muscle cramp and clinical variables such as co morbid condition, duration of disease, number of dialysis, pre dialysis weight, serum urea, serum creatinine, serum calcium and serum potassium.

CHAPTER - V

DISCUSSION

The purpose of the study was to evaluate the effectiveness of Muscle stretching exercise in terms of reduction of muscle cramps among patients undergoing hemodialysis in Shifa hospital and Galaxy hospital at Thirunelveli. The discussion chapter was based on the objectives specified in this study.

Objectives

1. To assess the pre - test and post - test level of muscle cramps among patients undergoing hemodialysis.
2. To find out the effectiveness of muscle stretching exercises on level of muscle cramps among patients by comparing pre and post intervention muscle cramps score.
3. To find out the association between the pre - test level of muscle cramps and selected clinical variables among patients undergoing hemodialysis.

Objective 1: The first objective of the study was to assess the pre- test and post - test level of muscle cramps among patients undergoing Hemodialysis.

Regarding the level of muscle cramps before the intervention among patients undergoing hemodialysis, were the majority of the samples 18 (60.00%) had moderate level of cramp and 12 (40.00%) had severe level of cramp and no one had mild cramp.

The present study findings were similar to study findings conducted by **Kingsle Kishore Coumar M.F, Renuka. K, Nalini S.J. (**2016) conducted a study and the results showed in assessment of pre-test and post-test level of muscle cramp(pain) among 40 patients undergoing hemodialysis revealed that in pre-test 19(47.5%) having severe, 18(45%) moderate, 3(7.5%) mild muscle cramp respectively whereas in post test 3(7.5%) having severe, 11(27.5%) moderate,17(42.5%) mild and 9(22.5%) having no level of muscle cramp.

Objective 2: The second objective of the study was to find out the effectiveness of muscle stretching exercises on level of muscle cramps among patients by comparing pre and post intervention muscle cramps score.

In this study the level of cramp among patients undergoing hemodialysis during the pre test the mean cramp score was 11.50 with standard deviation 3.26 and in the post test mean score was 1.76 with standard deviation 1.03. The obtained t value was 15.70 ($P<0.05$). The mean difference between the pre test and post test was high and statistically significant. Hence it was inferred that the Muscle stretching exercise intervention carried out among the patients undergoing hemodialysis was effective in reducing the muscle cramps.

The present study findings were similar to study findings conducted by Basemathmorris (2012). One group pretest post test study was conducted among 45 patients undergoing dialysis. Muscle cramps were measured muscle cramp tool. Results indicated that there was significant difference in the mean level of muscle cramps before and after intervention. The mean level of muscle cramps in the pretest and post test was 8.16 and 2.78 respectively with ‘t’ value 21.975 at ‘p’<0.001.

Finally it concluded that Intradialytic stretching exercises could alleviate the muscle cramps.

Objective 3: The third objective was to associate the pre test level of muscle cramps among patients with their selected clinical variables.

There was an association between the level of muscle cramps and the clinical variables such as duration of hemodialysis and amount of fluid removed during hemodialysis. There was no association between the level of muscle cramps and other clinical variables such as co morbid condition, duration of disease, number of dialysis, pre dialysis weight, serum urea, serum creatinine, serum calcium and serum potassium.

The present study findings were similar to study findings conducted by Cappy, Jablonka and Schroedes (1999) Sherman et al., 2007 Salwa Abass A. Hassan; Amany Sobhy Sorour (2013) Patrick G. Lynch et al (2014) Watson E.L et al (2014).

CHAPTER VI

SUMMARY, MAJOR FINDINGS, IMPLICATIONS AND RECOMMENDATIONS

This chapter deals with the major findings of study, the implications for nursing practice, the implications for nursing education, nursing research, and nursing administration and the recommendations for future research.

Summary of the study

The study was undertaken to evaluate effectiveness of Muscle stretching exercise in terms of reduction of muscle cramps among patients undergoing hemodialysis admitted in Shifa and Galaxy Hospitals. The study was experimental in nature. Study was conducted for a period of four weeks at Shifa and Galaxy hospitals, Thirunelveli. 30 samples were selected by using convenient sampling technique. During pre test, sample subjects were recognized based on the sample selection criteria during hemodialysis, muscle cramps assessment was done using muscle cramp assessment tool and the investigator demonstrated muscle exercises for 5 minutes and obtaining return demonstration on one to one basis. During post test, sample subjects were assisted to do the previously taught exercise during muscle cramps. After doing muscle stretching exercises, the effect of the exercises was also identified using Muscle Cramp Assessment Tool. The data were collected approximately for 2-3 study subjects per day.

Study was based on Modified Wiedenbach's Helping Art Clinical Nursing Theory. It provides comprehensive systematic framework for evaluating the effectiveness of Muscle Stretching Exercise in terms of reduction of muscle cramps

among patients undergoing hemodialysis. Descriptive and inferential statistics were used to report the findings.

Major findings of the study

Description of demographic variables:

Majority of the sample subjects 9 (30%) were in the age group above 61 years, and 6(20%) were in the age group of 46-50 years. Out of total sample subjects, the majority of the samples 16 (53.3%) were males and 14 (46.7%) of them were females. Based on the educational status, majority of the sample subjects 10(33.3%) were illiterate and 5 (16.70%) were post graduates. Based on the occupation, the majority 10 (33%) samples were private employee, 9 (30%) were coolie and 5(16.70%) samples were government employee.

Description of clinical variables:

Majority of the sample subject 10 (33.3%) had both diabetes and hypertension, 9 (30%) sample subjects had only hypertension, 6 (20%) had only diabetes. Regarding duration of disease, the majority 12 (40%) were in between 13 - 36 months and 8 (26.7%) were in between 7 – 12 months. Regarding duration of dialysis, the majority 19 (63.3%) had 4 hours session and 11 (36.7%) had 5 hours session. Based on the amount of fluid removed during dialysis, 4 litres fluid were removed in 16 (53.3%) persons and 3 litres fluid were removed in 14 (46.7%) persons. Based on the number of current dialysis, the majority 12 (40%) have undergone 21 – 30 times and 4 (13.3%) have undergone more than 40 times. Regarding pre dialysis weight, 14 (46.67%) of the sample subjects were more than 61 kg and 10 (33.33%) samples were less than 51 kg. Regarding serum urea level, the majority 16 (53.3%) persons had 81 –

120 mg/dL and 6(20%) samples had more than 120 mg/dL. Regarding serum creatinine level, the majority 12(40%) persons had more than 5 mg/dL and the 5(16.7%) persons had 0.6 – 1.4 mg/dL. Regarding serum calcium level, the majority 12 (40%) sample subjects had low calcium level and 8 (26.7%) sample subjects had high calcium level. Regarding serum potassium level, the majority 14 (46.7%) had normal potassium level, 8 (26.7%) of the samples had low potassium level and 8 (26.7%) of them had high potassium level.

Effectiveness of muscle stretching exercises on muscle cramps:

The mean post- test muscle cramps level was 1**.**76 which was lower than the mean pre-test muscle cramp level of 11**.**5. The obtained 't' value for the test was 15.70 which was significant at 0.05 level of significance. Conclusion was that there was significant reduction of muscle cramps among the patients undergoing hemodialysis after the exposure to Muscle Stretching Exercise intervention.

There was an association between the level of muscle cramps and the clinical variables such as duration of hemodialysis and amount of fluid removed during hemodialysis.

Conclusion

As hemodialysis patients often experiences muscle cramps, it is necessary to provide non-pharmacological interventions to reduce muscle cramps. The findings of the study indicated that the Muscle Stretching Exercises are simple, practicable and effective intervention.

Nursing Implications

The implication of the present study has been discussed under the headings as nursing administration, nursing education and nursing research.

i) Nursing Administration

The nurse administrator shall take initiative in organizing continuing nursing education program on non-pharmacological measures 'Muscle Stretching Exercises for muscle cramps reduction and formulate policies, protocols in muscle cramp management among patients undergoing hemodialysis.

ii) Nursing Education

Integration of theory and practice is a vital need and it is important in nursing education. Patients undergoing hemodialysis has been included since the beginning of years of nursing education, but focus on measures against its complication like muscle cramp are yet to be highlighted. With emerging health care trends nursing education must focus on non-pharmacological innovations to enhance nursing care.

Nurse educators need to lay emphasis in the curriculum on Muscle Stretching Exercises for patients undergoing hemodialysis in reduction of muscle cramps and other interventions to keep the patient comfortable during hemodialysis.

iii) Nursing Research

As there are fewer studies related to intervention for muscle cramps there is need for extensive and intensive studies in this areas. There is a great need for research on the innovative methods of creating awareness, development of audio-visual aids and educates nurses in the management of clinical problems during

hemodialysis. As evidence based practice is a recent trend in nursing, this will further encourage studies on the effectiveness of reducing muscle cramps related to hemodialysis.

Limitations

The limitation of the study was that convenient sampling technique was used and the sample size was 30. Hence the study findings cannot be generalized to the population.

Recommendations

- The study can be conducted by using a random sample to generalize the findings.
- Study can be replicated with patients from different settings.
- A comparative study can also be done between the effectiveness of other non-pharmacological measures and Muscle Stretching Exercises intervention.
- The effectiveness of Muscle Stretching Exercises can be evaluated for other conditions like evaluating muscle strength, quality of life, cardiopulmonary fitness, and ability to perform activities of daily living.

BIBLIOGRAPHY

Books:

- Allen R, Nissensson M.D. (1995).Clinical Dialysis. Philadelphia: Simson and Schuster Company.
- **Brunner and Suddarths. (2011). Textbook of Medical Surgical Nursing. (12th ed.). Wolters Kluwer Lippincott Williams and Wilkins Publication.**
- Daniels. R, Nosek .L.J, Nicoll. L. H. (2007).Contemporary Medical Surgical Nursing. (1st edition). Haryana: Thomson Delmar Learning.
- Gutch.CF.(1993) Review of Hemodialysis for Nurses and Dialysis Personals. Missouri: Mosby Publication.
- John Luck Mann. (1987). Medical Surgical Nursing. (3rd ed.). London: Saunders Company.
- John T, Daugirdas. (2005). Handbook of Dialysis. Lippincott Williams publication.
- **Joyce M Black & Hawks, J.H. (2005). Medical surgical nursing. (7th ed.). Volume 2, Elsevier Mosby Publication.**
- Kothari. Research Methodology and Techniques. (2004). New Delhi: New International Publishers.
- Lewis, Heitkemper & Dirksen. (2011). Medical Surgical Nursing Assessment and Management of Clinical Problems. (7th ed.). Elsevier Mosby Publication.
- Linton, Maebius.(2003). International to Medical Surgical Nursing. U.S.A: Elsevier science publishers.

- **Lippincott** (2009). Manual of Nursing Practice. (9th ed.). **Wolters Kluwer. Lippincott Williams and Wilkins Publication.**
- Louis White and Gena Duncan (2002). Medical Surgical Nursing, Delmar: Thomson Learning Trademark.
- Park. K. (2011). Preventive and Social Medicine. (19th ed.). Jabalpur: Banarsidars Publications.
- Phipps (2001). Medical Surgical Nursing, (3rd ed.). Mosby Publications.
- **Piyash Gupta (2010). Textbook of Preventive and Social Medicine. (3rd ed.). New Delhi: CBS publishers and distributing private limited.**
- **Polit D.F. Beck. (2007).Nursing research (8th edition). Wolters Kluwers publisher's private limited.**
- Potter. P.A & Perry. A.G. (2003). Basic Nursing-Essentials for Practice. (5thed.). Noida: Mosby publications.
- **Ross and Wilson, (2005). Anatomy and Physiology in Health and Illness. (9th ed.). Philadelphia: Elsevier Publication.**
- **Suresh. K. Sharma (2008).Nursing research and statistics. (1st ed.). Elsevier medical publishers.**
- Urden, L.D., Stacy, K.M., & Lough, M.E. (2004): Priorities in critical care nursing. (4thed.). Philadelphia: Mosby Elsevier.
- **Watson's (2000). Clinical Nursing and Related Studies. (5th ed.). London: Bailliere Tindall Association of publication.**
- White. L. Delmar Thomson. (2002). Medical Surgical Nursing. (2nd ed.). Mosby publication**.**

Journals:

- Ahsan, M., Gupta, M., Omar, I et.al.(2004): Prevention of hemodialysis related muscle cramps by intradialytic use of sequential compression devices: A report of four cases- Hemodialysis. **International Journal of Nephrology**, 8(3), 283-6.
- Atar,I., Konas, D., Acikel, S. (2006): Frequency of atrial fibrillation and factors related to its development in dialysis patients. **International Journal of Cardiology**,106, 47–51.
- Bakk, C.K. (2010): Clinical and cost effectiveness of guidelines to prevent intravascular catheter-related infections in patients on hemodialysis. **Nephrology Nursing Journal**, 37(6), 601-15.
- Baraz S & Mohamadi E. (2006) Comparative study on the effect of two methods of self-care education (direct and indirect) on quality of life and physical problems of hemodialysis patients. **Arak Medical University Journal**, 9, 1–16.
- Bennap & Lacquantin F.(1990). Complications during Routine Hemodialysis Treatment. **Journal of Clinical Nephrology**,16(10), 185-192.
- Cheema BSB & Singh MAF.(2005). Exercise Training in Patients Receiving Maintenance Hemodialysis: A Systematic Review of Clinical Trials. **American Journal of Nephrology**, 25, 352-364.
- Dan Bayliss.(2006). Effects of Intradialytic Exercise Program Nephrology News and Issuesd Vieira Er Stretching Review to Reduce Work-Related Musculoskeletal Disorders: A Systemic Review. **Journal of Rehabilitation Medicine**, 40(5), 321-8.

- Hansen. (2000).The Problem Associated On Chronic Dialysis. **Journal of International Medicine,** 22(9), 319- 325.
- Johansen KL, Chertow GM, Jin C, Kutner NG. (2007) Significance of Frailty Among Dialysis Patients. **Journal of American Society of Nephrology,** 18, 2960-2967.
- Joline L.T & Susan. (2009.).Effect of Intradialytic Low-Intensity Strength Training in Adult Hemodialysis Patients. **Journal of American Society of Nephrology**, 24(8), 3980 – 86.
- Katzberg Hd & Khan Ah.(2010). Assessment of Muscle Cramps- An Evidenced Based Review: **Journal of Clinical Nephrology**, 74, 691-96.
- Mandel Tange. (2004). Effect of Muscle Cramps in Hemodialysis. **Journal of Behavioral Medicine,** 15(4), 313-320.
- Ronaldo R, Gustavo L. Coutinho; Anderson Iuras et al.(2013). Effect of resistance exercise intradialytic in chronic renal patients undergoing hemodialysis. **Brasilian Journal of Nephrology,** 336(7646),701-4.
- Segura-Orti.(2010). Exercise in Hemodialysis Patients: Literature Review. **Journal of Nephrology**, 30(2), 236-46.
- Tabrizi M, Najafi M, Samiey S, Einollahi B, Babaei GH.(2009). Effect of programmed nursing care in prevention of hemodialysis complications. **Iranian Journal of Critical Care Nursing.** 2, 55–9.
- Tae DJ & Park SH.(2011). Intradialytic Exercise Programs for Hemodialysis Patients. **Chonnam Medical Journal**, 47(2), 61-65.

Websites:

- Agarwal SK, Dash SC, Irshad M, Raju S, Singh R, Pandey RM.(2005). Prevalence of chronic renal failure in adults in Delhi, India. Nephrol Dial Transplant, 20(8):1638–42. www.indian renal facesheet.com
- Hurst, J.A. (2009). Incidence related to muscle cramps in hemodialysis. www.renalbusiness.com.
- Mitra Zolfaghari et al. (2015). Comparison of two educational methods (family centered and patient-centered) on hemodialysis: Related Complications. Iran Journal of Nursing .20(1): 87–92. Retrieved from www.pubmed.com - PMC 4325420
- Mohamed M, Ahmed A, Zead SA. (2007).Impact of stretching exercises protocol on reduction of muscle cramping during hemodialysis, among Chronic renal failure patients. Asian Medical Journal, 5(2). Retrieved from www.medplus.com-http://dx.doi.org/10.1155/2014/681969.
- Sherman RA, Goodling KA, Eisinger RP. (1982). Acute therapy of hemodialysis - related muscle cramps. American Journal of Kidney Disease 2: 287 http://cursoenarm.net/4/55/4990/abstract14.

APPENDIX A & B

NEHRU NURSING COLLEGE

G.O.(MS) NO. 486 HEALTH DATED ON 27.8.98

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY PROC. NO.:18677/AFFLN.II(1)/99 Dated on 28.9.2000

APPROVED BY TAMIL NADU NURSES AND MIDWIVES COUNCIL AND INDIAN NURSING COUNCIL

NEHRU NAGAR, POST BOX NO. 3,
TIRUCHENDUR ROAD, ***VALLIOOR - 627 117.***
TIRUNELVELI DIST, TAMILNADU.

Email : nehrunursingcollege@gmail.com
Tel : 04637 - 221460, 222126
Teli Fax : 04637 - 221460

Your Ref :

Date : 20/11/2015

Our Ref : NNC/Thesis/02

To,
The Medical Director,
Shifa Hospital,
Thirunelveli.

Sub: Requisition for conducting the research study- A.Daphney Ethal, M.Sc (N) IIyear student.

Respected sir,

As a part of the curriculum requirement under the Tamilnadu Dr. M.G.R. Medical University, our M.Sc (N) II year student A. Daphney Ethal would like to conduct a research during her course of study. She has selected the following topic for research,

"A STUDY TO ASSESS THE EFFECTIVENESS OF MUSCLE STRETCHING EXERCISES ON REDUCTION OF MUSCLE CRAMPS DURING HEMODIALYSIS AMONG PATIENTS UNDERGOING HEMODIALYSIS IN SELECTED HOSPITALS AT THIRUNELVELI".

As we would like to conduct the research in Shifa Hospital, we kindly request you to grant her permission to conduct the study in your esteemed hospital. I assure you that she will abide by the policies of the hospital and not cause any disturbance to the routine client care. Kindly consider and grant permission for the above mentioned study purpose during the clinical posting period from January 1st to 31st 2016.

Thanking you,

Yours faithfully,

Vallioor,
Date:

NEHRU NURSING COLLEGE - Vallioor -

Cohra Nursing College
Principal

Administrative Officer
SEFA HOSPITALS
82, Kallaseppuram Middle St,
Tirunelveli Junction - 627 001

APPENDIX C &D

NEHRU NURSING COLLEGE

G.O.(MS) NO. 486 HEALTH DATED ON 27.8.98

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY PROC. NO :18677/AFFLN.II(1)/99 Dated on 28.9.2000

APPROVED BY TAMIL NADU NURSES AND MIDWIVES COUNCIL AND INDIAN NURSING COUNCIL

NEHRU NAGAR, POST BOX NO. 3,
TIRUCHENDUR ROAD, *VALLIOOR - 627 117.*
TIRUNELVELI DIST, TAMILNADU.

Email : nehrunursingcollege@gmail.com
Tel : 04637 - 221460, 222126
Teli Fax : 04637 - 221460

Your Ref :

Date : 20/07/2015

Our Ref : NNC/Thesis/01

To,
The Medical Director,
Galaxy Hospital,
Thirunelveli.

Sub: Requisition for conducting the research study-A. Daphney Ethal, M.Sc (N) IIyear student.

Respected sir,

As a part of the curriculum requirement under the Tamilnadu Dr. M.G.R. Medical University, our M.Sc (N) II year student A. Daphney Ethal would like to conduct a research during her course of study. She has selected the following topic for research,

A STUDY TO ASSESS THE EFFECTIVENESS OF MUSCLE STRETCHING EXERCISES ON REDUCTION OF MUSCLE CRAMPS DURING HEMODIALYSIS AMONG PATIENTS UNDERGOING HEMODIALYSIS IN SELECTED HOSPITALS AT THIRUNELVELI.

As we would like to conduct the research in Galaxy Hospital, we kindly request you to grant her permission to conduct the study in your esteemed hospital. I assure you that she will abide by the policies of the hospital and not cause any disturbance to the routine client care. Kindly consider and grant permission for the above mentioned study purpose during the period from January 1st to 31st 2016.

Thanking you,

Yours faithfully,

Nehru Nursing College

Vallioor,
Date:

NEHRU NURSING COLLEGE Vallioor

Public Relation Officer
Galaxy Hospitals
Tirunelveli - 627 003.

APPENDIX E

LETTER SEEKING EXPERT'S OPINION FOR CONTENT VALIDITY

From

Ms. Daphney Ethal.A,
M.Sc (N) First Year,
Nehru Nursing College,
Vallioor.

Through,

The Principal,
Nehru Nursing College,
Vallioor.

To,

Respected Madam / Sir

Sub: Requesting opinion and suggestion for establishing content validity of Research Tool.

I would like to bring to your kind consideration that as a part of my M.SC (N) II Year curriculum, I have selected the below mentioned topic for dissertation to be submitted to the Tamilnadu Dr. MGR Medical University, Chennai as a partial fulfilment of the degree of Master Science in Nursing. My Research topic is

A Study to assess the effectiveness of intra dialytic stretching exercises on muscle cramps during hemodialysis among patients undergoing hemodialysis in selected hospitals at Thirunelveli.

With regard I kindly request you to validate my tool for its appropriateness and relevancy. I am enclosing need for study, statement of the problem, objectives and the data collection tool. I would be highly obliged and remain thankful for great help if you validate and suggest your opinion.

Thanking you,

Place:
Date:

Yours Sincerely,

(Daphney Ethal.A).

Forwarded
NEHRU NURSING COLLEGE
Principal

APPENDIX – F

List of experts to validate the tool

Dr. Balasubramanian, MD, DM,
Nephrologist,
Galaxy Hospital,
Thirunelveli.

Dr.S.S. Sharmila Jansi Rani, M.Sc N, Ph.D
Professor,
Christian College of Nursing
Neyyoor.

T. Angel Priya, M.Sc N, Ph.D,
Principal,
The Salvation Army Catherine Booth College of Nursing,
Nagercoil.

Mr.S.Anandh Sam Perera, M.Sc N,
Assistant Professor,
The Salvation Army Catherine Booth College of Nursing,
Nagercoil.

Mrs.Moona.J.Cicil, M.Sc N,
Assistant Professor,
Christian College of Nursing,
Neyyoor.

Mrs.Sheeba, M.Sc N,
Assistant Professor
Christian College of Nursing
Neyyoor.

APPENDIX - G

A) DEMOGRAPHIC VARIABLES

Put a tick (✓) mark in the Appropriate Column

1. Age :

   e) 40 - 45 years ☐
   f) 46- 50 years ☐
   g) 51- 55 years ☐
   h) 56- 60 years ☐

2. Sex :

   a) Male ☐
   b) Female ☐

3. Education :

   a. Illiterate ☐
   b. Only school ☐
   c. Diploma / degree ☐
   d. Post graduate ☐

4. Occupation :

   a. Government employee ☐
   b. Semi government employee ☐
   c. Private employee ☐
   d. Coolie ☐

B) CLINICAL VARIABLES

Put a tick (✓) mark in the Appropriate Column

1. Co – morbid condition
   e) Diabetes ☐
   f) Hypertension ☐
   g) Diabetes & hypertension ☐
   h) Any other ☐

2. Duration of disease:
   e) Less than or equal to 6 months ☐
   f) 7 - 12 months ☐
   g) 13 - 36 months ☐
   h) 37 - 60 months ☐

3. Duration of dialysis:
   e) 2 hours ☐
   f) 3 hours ☐
   g) 4 hours ☐
   h) 5 hours ☐

4. Amount of fluid removed during dialysis:
   a) 1 litre ☐
   b) 2 litres ☐
   c) 3 litres ☐
   d) 4 litres ☐

5. No. of current dialysis:
   a) 1 - 20 times ☐
   b) 21 -30 times ☐
   c) 31 - 40 times ☐
   d) More than 40 times ☐

6. Pre dialysis weight:
    a) Less than or equal to 40 kg ☐
    b) 41 – 50 kg ☐
    c) 51 – 60 kg ☐
    d) 61 – 70 kg ☐
    e) More than 70 kg ☐

7. Serum Urea:
    a. 20 - 40 mg/ dL ☐
    b. 41- 80 mg/ dL ☐
    c. 81- 120 mg/dL ☐
    d. More than 120 mg/dL ☐

8. Serum Creatinine:
    a. 0.6 – 1.4 mg/dL ☐
    b. 1.41 - 2 mg/dL ☐
    c. 2.1 - 5 mg/dL ☐
    d. More than 5 mg/dL ☐

9. Serum Calcium:
    a. 6 - 8.5 mg/dL ☐
    b. 8.6 - 10 mg/dL ☐
    c. 10.1 - 15 mg/dL ☐
    d. More than 15 mg/dL ☐

10. Serum Potassium:
    a. 2.5 - 3.4 mEq/L ☐
    b. 3.5 - 5 mEq/ L ☐
    c. 5.1- 8 mEq/L ☐
    d. More than 8 mEq/L ☐

Muscle Cramp Assessment Tool

[Ashworth muscle cramp scale -Modified]

Sl.No	Criteria	0	1	2	3	4
1.	Nature of cramp	Normal muscle tone	Mild increase in muscle tone, when the affected part is moved in flexion or extension	More marked increase in muscle tone through most of the ROM, but affected part is easily moved	Considerable increase in muscle tone, Passive movement difficult	Affected part rigid in flexion or extension
2.	Frequency of cramp	No cramp	1-2 times	3-4 times	5-6 times	>6 times
3.	Duration of cramp	Nil	1-2 minutes	3-4 minutes	5-6 minutes	>6 minutes
4.	Level of pain	No pain	1-3	4-6	7-8	9-10

Total Score:16

SCORE INTERPRETATION:

I. No cramps : 0
II. Mild cramps : 1-4
III. Moderate cramps: 5-10
IV. Severe cramps : 11-16